A Culture of High Speeds and Accumulating Debt

A CASE STUDY OF FRENCH HIGH SPEED RAIL FINANCING PRACTICES

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Abstract

This paper set out to study the methods used to finance High Speed Rail (HSR) in France. It began by introducing the concept of high speed rail and the history of rail development in France to provide context for the state of rail in France today. Rail development history revealed a longstanding tradition of debt which has prevailed in modern times. As France continued to develop its rail network it shifted its financing methods from public debt financing to public-private partnerships. This case study of French HSR financing revealed the true cost of an extensive network which is often overlooked when the country is cited as a model. The paper concludes with lessons to be learned about France's willingness to subsidize HSR, an ideology which may not be successfully transposed to other countries.

Introduction

North American proponents of high speed rail often cite the success of France's rail system by the length of track they have laid, the positive environmental impact, or the high ridership it has garnered. However, this case study of France's high speed rail network indicates that none of these indicators are telltale of sustainable success.

High speed rail first appeared in Japan in 1964; the line operated between Tokyo and Osaka (Henn et al., 2013). Henn et al. (2013) state that the success of the Japanese Shinkansen HSR rail prompted the European Union, and foremost France, to invest in similar technology by the late 1970s. Today, there are 24 countries with HSR systems and several other countries with systems under construction (Worldwatch Institute, 2015).

In 2011, French President Nicholas Sarkozy said, "The TGV, it's France" but train travel has been an important part of French culture since long before the high speed trains started running. As early as 1914 the train was recognized for its potential to mobilize troops to the German border rapidly. Since then, the technology has rapidly evolved to allow for speeds up to 380 kilometers per hour. High speed passenger rail has offered shorter travel times, the convenience of city-center stations, and competitive fares since 1981 when the first French line

connecting Paris and Lyon line was inaugurated. However, convenience has come at a price for the publicly owned operator. The agency is crippled by debt and undergoing restructuring which may put growing the French high speed rail network on hold.

This report will provide a brief history of rail in France followed by a discussion of the key decision makers over the last 80 years. It will explain the structural changes brought about by two major rail reforms and assess if, and how, these changes have contributed to the growing rail debt. The evaluation of debt leads into a more detailed discussion of various high speed rail financing methods used in France and concludes on the successes and failures of these models as lessons learned.

Literature Review

What is High Speed Rail?

A HSR system is comprised of both infrastructure and rolling stock (European Union, 2004). Infrastructure is the physical track and stations while rolling stock are the cars and trains which utilize the track (European Union, 2004). The European Union (2004) definition states that both the infrastructure and the rolling stock must be able to guarantee safe travel at speeds exceeding 200 kilometers (km) per hour on upgraded existing track and speeds exceeding 250 km per hour on new track (Worldwatch Institute, 2015). True HSR systems run on new "exclusive and independent tracks", however, conventional track has been upgraded to support speeds up to 200 km per hour (Rodrigue, 2013).

Costs and Financing

Henn et al. (2013) establish HSR construction as "mega public infrastructure projects" with high upfront capital construction costs in comparison to operating costs. They state that choosing the optimal funding mechanism requires an understanding of overall costs, cost sharing between partners, and risk allocation. They outline the three phases of infrastructure financing as a pre-project stage, secondly construction, and lastly operations and maintenance. Campos and de Rus (2009) further disaggregate construction costs to: land acquisition, planning,

studies, followed by building costs which incorporates terrain preparation and platform construction, and finally “all rail-specific elements”.

These various facets of HSR costs impact the financing methods for HSR development. Developing a network is costly and economic returns on all the lines may not suffice in justifying the overall costs. Countries need to weigh the financial costs and benefits in addition to the social and societal benefits which may ensue when deciding on proper financing methods.

Why France Built HSR

France’s first high speed rail line known as the TGV, connecting Paris and Lyon, was inaugurated in 1981 by President Francois Mitterand (Henn et al., 2011). Freemark (2011) argues that since the TGV’s opening, HSR has successfully lured passengers away from commercial airlines. Around 83 percent of French residents have ridden the TGV, a percentage not far from the amount of Americans which have flown (Freemark, 2011).

The TGV alternative was pursued in France because it provided a “low-carbon travel alternative” given that the majority of the country’s electricity comes from nuclear plants (Freemark, 2011). The HSR system improved passenger travel times by removing passenger trains from freight rails, decreasing congestion, in turn increasing freight line capacity (Ashiabor & Wei, 2013; Ross, 2011). Lane (2012) corroborates that this decongestion also applies to airports and better flight on-time performance. City residents have shown a clear preference for reliable transportation (Ross, 2011). The TGV carries about 100 million passengers per year which amounts to 1.5 times the total population (Freemark, 2011). In 2016 the system spanned just over 2,000 km with an additional 670 km under construction, see Figure 1.

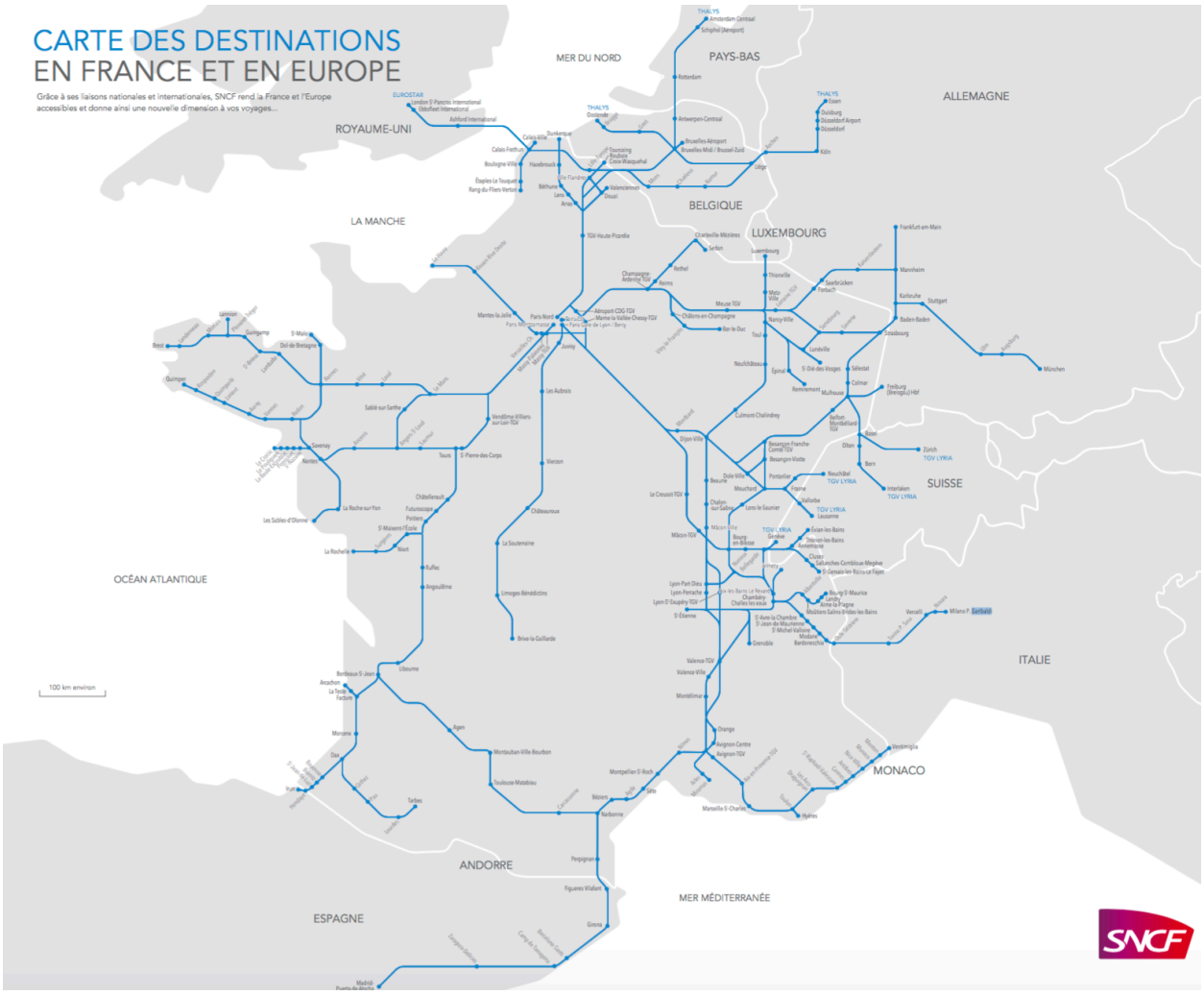

Figure 1: Map of 2016 HSR Network (SNCF, 2016)

Prior to 2014, the Reseau Ferroviaire de France (RFF), the national public rail infrastructure owner was responsible for building the TGV lines with a combination of funding from “local, regional, and national governments” as well as track useage fees (Freemark, 2011). The track useage fees were passed down to the SNCF, Société Nationale des Chemins de Fer Français, which translates to "national society of French railways", that operates both the TGV and intercity trains (Henn et al., 2013; Freemark, 2011). However, the high construction costs of the HSR lines in France placed the RFF in substantial debt, circa 33.7 billion euros in 2013 (de la Brosse, 2014).

In 2012 a new legislation was passed which on January 1st, 2015 merged the RFF and the SNCF into the new, state-owned SNCF Reseau, the sole manager and proprietor of the French rail system (SNCF Reseau, 2015). The merger was the result of a major rail reform in France and the attempt to consolidate rail management into one organization (SNCF Reseau, 2015). This consolidation also resulted in the transfer of a portion of RFF's debt to the SNCF (de la Brosse, 2014). Today, the SNCF's debt is steady at 7.4 billion euros (SNCF, 2015).

According to Garmendia et al. (2012) French high speed rail corridors proved to have economic impacts which reinforced the dominance of the regional capital rather than the regions surrounding it because it facilitated "connection to the national capital or big metropolitan areas". It particularly undermined the growth of "former industrial sub-regions". Their research unearths the need for policies that promote equitable corridor development. The European Union created the European Territorial Strategy as a means to promote "territorial cohesion" but according to Garmendia et al. (2012) "these strategies have not been clearly materialized".

Talk of HSR in the US

In 2008 the Obama administration set aside $8 billion in the American Recovery and Reinvestment Act (ARRA) to spur high-speed rail development in the United States (Reutter, 2010; Ashiabor & Wei, 2013). In 2009, the Federal Railroad Administration (FRA) created the High Speed Intercity Passenger Rail (HSIPR) to oversee the creation of high speed passenger rail corridors (Ross, 2011). The ARRA funds were distributed by the FRA to six major corridors to conduct feasibility studies, of which three, Florida, Ohio, and Wisconsin returned the money and describing it as "wasteful federal government spending" (Ashiabor & Wei, 2013).

Opposition to the creation of high speed rail in the US stems from the costs of creating such a system in a country which spans over 2,500 miles from east to west coast (Lane, 2012). Air travel has become convenient and widely used in the US, hence an effective HSR system in the US would not run the entire length of the country but rather connect pairs of cities 100 to 600 miles apart (Lane, 2012). Lane (2012) argues that there is not enough population centrally distributed in the US to warrant "intra-continental rail trips" therefore the system network

proposed by the FRA focuses on connecting regional hubs instead to create regional rail corridors.

Opponents question the likelihood of this form of rail being able to rival low-cost airlines and personal automobiles for intercity trips (Lane, 2012). A 1987 study by Bonnafous estimated that over 30 percent of French HSR patrons switched modes from air transport and a little under 20 percent came from automobiles. Spain saw a shift in rail share from 14 to 41 percent in the Madrid to Seville corridor after the opening of the HSR route (Gonzalez-Savignat, 2004). Lane (2012) argues that the willingness to pay for intercity air fares demonstrates that consumers are willing to pay a premium for shorter travel times. To best rival air travel, HSR stations should be built in "centralized, dense, and highly-accessible" locations to provide riders with access to other modes of transportation (Lane, 2012; Ashiabor & Wei, 2013; Gonzalez-Savignat, 2004).

The success of rail experienced in Europe may be challenged by the enduring perception of the automobile is a symbol of social class. A 2006 survey of Americans indicated that "69 percent of Americans still described driving as something they liked to do" (Becker & George, 2011). However, an advantage that train travel presents over automobile is the ability to complete other tasks during the trip, and the ability to reach speeds of up to 200 miles per hour, three times the US legal highway speed limit (Gonzalez-Savignat, 2004).

Proponents of HSR argue that the technology has fewer negative externalities than "short-haul air travel" given that the technology is powered by electricity (Lane, 2012). Opponents argue that that very little electricity in the US comes from 'clean sources' such as hydro and nuclear (O'Toole, 2009). The US Energy Information Administration concluded that in 2014, 67 percent of electricity in the US came from fossil fuels. Bradley Lane also argues that trains provide a more comfortable travel option as airplane seats, and legroom space, have been declining steadily in size since the 1970s (Elliott, 2015). Garmendia et al.'s (2012) research found that for trips between 2 and 3 hours there is direct competition between HSR and air travel. However, for trips under 2 hours their research showed that HSR travel was the preferred mode.

Economic benefits could be derived from the monetization of time savings from reduced car congestion which the Economist estimated in 2005 cost the US $63.1 billion dollars yearly (Becker & George, 2011). One study found that a $10-million-dollar investment in transit capital generated $30 million in revenue from surrounding businesses; an equal investment in transit operations was found to generate $32 million in business revenue (FXM Associates, 2008).

California's HSR Project

November of 2008, the voters of California approved Proposition 1A, a high speed passenger train bond which allocated $950 million to the development of HSR in their state (California Transportation Commission, 2014). The decision to go build HSR in California has been highly contested by "the California Legislative Analyst's Office, State Treasurer, California High-Speed Rail Peer Review Group, State Auditor, a State Senate Committee, and other independent reviewers" due to the lack of long-term funding plans (Reason Foundation, 2013).

The California High Speed Rail Authority (CHSRA) oversees the construction of the bullet train whose first phase spans from San Francisco to Anaheim via twelve stations over 500 miles. Phase 2 adds a leg connecting Sacramento to Merced and San Diego to Los Angeles (CHSRA, 2015). Phase 1 is projected to open in 2029.

Only $12.5 billion were secured in 2013 through the Proposition 1A bonds and federal grants (Reason Foundation, 2013). In 2014, an additional revenue stream was added by the California legislature; 25 percent of the cap-and-trade fees, or revenue from the private companies purchasing carbon allowances would be allocated to high speed rail (Vartabedian, 2015; Young, 2015). While cap-and-trade fees could result in one-quarter of a billion to one billion dollars annually, this would amount to a maximum of 14 billion in cap-and-trade fees. Cumulatively, these funding sources amount to a little over 26 billion which is less than half of the project's estimated cost of 68 billion dollars (Vartabedian, 2015).

History

The first rail line in France opened in 1827 and was used to transport coal. Ten years later the first French passenger rail line opened, financed entirely by private citizens. It was the law of 1842 which enacted French State-financed passenger rail expansion (Loi du 11 juin 1842). Rail was quickly perceived as a lucrative enterprise and businesses offered to finance their construction; by 1883 there were 26,000 kilometers of track and over 25 million euros (1918 francs adjusted to 2016 euros) spent of which close to 19 million were private monies (Picard, 1918; France-Inflation, 2016). This can be regarded as the time period in which France began using public-private partnerships to finance rail. However, the State took on building costs but was not the operator. By 1920, after World War One and six years of inflation, rail operators were losing money ("The story of French rail", 2015).

The Players

The SNCF – Société national des chemins de fer français or National society of French railways – was created in 1937 as a response to the cumulative rail operator debt which reached 37 billion francs in 1936. For the next 45 years France's five largest rail companies merged to form a single French network operated by the State ("The story of French rail", 2015).

On 31 December 1982, the 1937 agreement expired and SNCF became an ÉPIC, defined as a state-owned enterprise responsible for managing a public service of an industrial and commercial nature. As sole shareholder, the French State has full operational autonomy ("The story of French rail", 2015).

Despite public management and State oversight, the SNCF's debt ballooned to over 100 million francs in 1990 ("Comptes transports de la Nation", 2013). The SAAD – Service annexe d'amortissement de la dette – a debt servicing agency was devised in 1991 as a means of structuring SNCF debt and managing annual State allocations designated to pay off this debt. Sectioning off a portion of the debt, 5.7 billion, was thought to make the remainder of the SNCF's debt more manageable (Cours des Comptes, 2002; "La dette de la SNCF", 2007). In 2006, Eurostat, in a letter addressed to the French National Institute of Statistics and Economic

Studies requested that SAAD's debt be reclassified as public debt ("La dette de la SNCF", 2007). The French State took on SAAD's debt in 2007 and the agency was terminated (Eymery et al., 2015).

The first major French rail reform in 1997 created the RFF – Réseau Ferré de France – who became the rail infrastructure manager (Eymery et al., 2015). The RFF was conceived to build new systems with capital borrowed from private financial markets.

On January 1, 2015 a second rail reform went into effect in which the RFF was replaced by SNCF Réseau in an attempt to unite all rail responsibilities under the purview of the SNCF. SNCF Réseau handles network access, rail traffic, maintenance, and engineering and consultancy work ("Press Release", 2015).

Rail Reforms

The first French rail reform enacted in 1997 had three overarching objectives: separate the management of infrastructure and operations, balance the SNCF's books, and better financing methods for infrastructure projects (Cours des Comptes, 2002; "La réforme ferroviaire", 2013). The result of the separation was a partially integrated and simultaneously disjointed division of labor where the infrastructure manager, now the RFF, was no longer the operator but continued to delegate systems operations such as timetabling and maintenance to the operator, the SNCF (de la Brosse, 2012).

To address the solvency, two-thirds of the SNCF's quickly accruing debt (20.5 billion euros) was shifted to the RFF, see Figure 2 (Cours des Comptes, 2002; de la Brosse, 2012). The majority of this debt originated from mass investment in five lignes a grandes vitesses (LGV), or high speed rail lines: LGV Sud-Est (opened in 1981), LGV Atlantique (1990), LGV Rhone-Alpes (phase 1-1992, phase 2- 1994), LGV Nord (1993), and LGV Interconnexion Est (1994) (Eymery et al., 2015). While these changes improved the SNCF's debt it gave the RFF a difficult start.

The SNCF was required to pay tolls to the RFF in order to make use of the tracks. The tolls were fixed in 1997 and 1998 but by 1999 the RFF increased the tolls by 61 percent from 915.9 million euros to 1,824 million. Despite the increase in revenue from the tolls, the RFF's operating

income remained negative even before it began debt payments (Cours des Comptes, 2002). Although this inefficiency was noted in 2002, it was never properly addressed. Instead, the RFF continued to increase its tolls: 6.4 percent in 2009, 11 percent in 2010, and 11.7 percent in 2011 slashing SNCF profits, causing a rise in debt over that period shown in Figure 2 (Rousseau, 2011).

Combined the SNCF and RFF had 41 billion euros debt in 2013 up from 36.1 billion when the reform was instituted, see Figure 2; that number was projected to reach 60 billion by 2022 if nothing was done (Eymery et al., 2015; de la Brosse, 2012). The ongoing debt crisis set the stage for another reform.

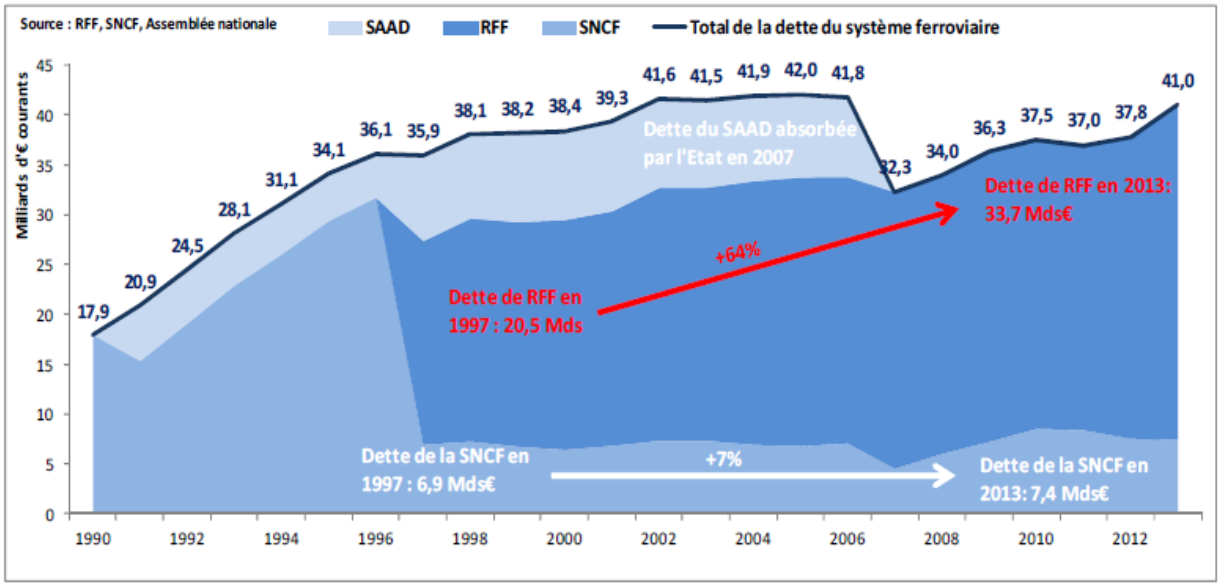

Figure 2: SNCF and RFF Debt 1990-2013 (in billions of Euros) (Eymery et al., 2015)

The second rail reform was adopted as law on August 4, 2014 and enacted in 2015 as a means of reversing the structural changes brought about by the 1997 reform ("La reforme ferroviaire", 2013). This reform was highly contested by the largest SNCF employee union, the CGT. The union published a study on the consequences of the reform which estimated that 9,000 to 10,000 full-time employees would be laid off by 2020 (Jacqué, 2015b).

In an assessment of the 1997 reforms, the Cours des Comptes, "the supreme body for auditing the use of public funds in France" referred to the relationship between the French State, the

SNCF, and the RFF as “complex” and “somewhat opaque” (“Our organization”, 2015; Cours des Comptes, 2002). The creation of the RFF diluted the responsibilities of both organizations, disempowering them from fully carrying out their duties (“La reforme ferroviaire”, 2013). Collaboration would have been needed to succeed. However, collaboration was unlikely when the SNCF and RFF both had budget deficits and were funded from the same sources: the French State and each other (Cours des Comptes, 2002).

The reform seeks to reduce costs by cutting redundancies which the 1997 reform created by dividing the SNCF without compromising railway industry working conditions. It sets out to restructure the SNCF’s management to streamline decision making and provide greater transparency to the public (“La reforme ferroviaire”, 2013).

Debt

There has been much controversy around the growing amount of debt incurred for rail, but the question of whether this debt is “good” or “bad” has not been addressed. A 2005 report on French debt commissioned by the French Minister of Finance stated that public debt can be reasonably incurred, and paid for by future generations, if the debt contributes towards public goods from which future generations will benefit (Pebereau, 2005). According to this definition of debt, further investment in rail is justified even when current revenue is insufficient because it is a social good. In such, the question that poses itself is how much good debt leads to a bad debt? The following section of the report will seek to assess where the debt is being generated in order to determine what type of debt is being incurred.

Prior to 2015, there were three primary financers of the rail network: the RFF, the SNCF, and the government, they formed the “train triangle”, see Figure 3 (Eymery et al., 2015). French rail operator debt (RFF, SNCF, and SAAD) more than doubled between 1990 and 2013 despite the French government taking on the SAAD’s 8.5 billion euro debt in 2007, refer to Figure 2 (Eymery et al., 2015).

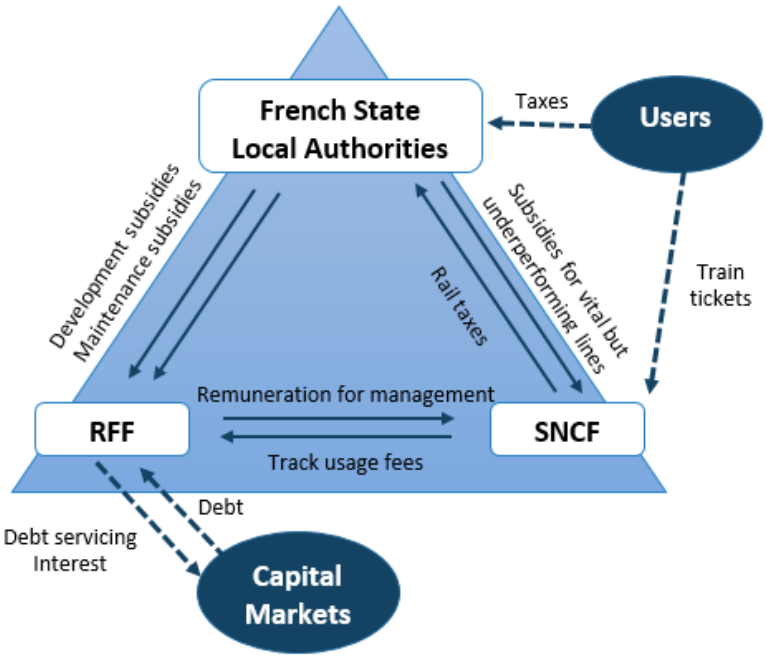

Figure 3: "Train Triangle" Monetary Exchanges (Eymery et al., 2015)

The growing debt is the result of the RFF’s annual budgetary deficits, which grew at an increasing pace in the past decade (Eymery et al., 2015). The financial imbalance was said to be due to an inflation in production costs, catching up on a backlog in railway maintenance, spending on large infrastructure projects and on the interest due on money borrowed for said projects (“Réforme du system ferroviaire”, 2014). Figure 4 shows that the majority of the costs not paid for are on the infrastructure side, the responsibility of the RFF up until 2015.

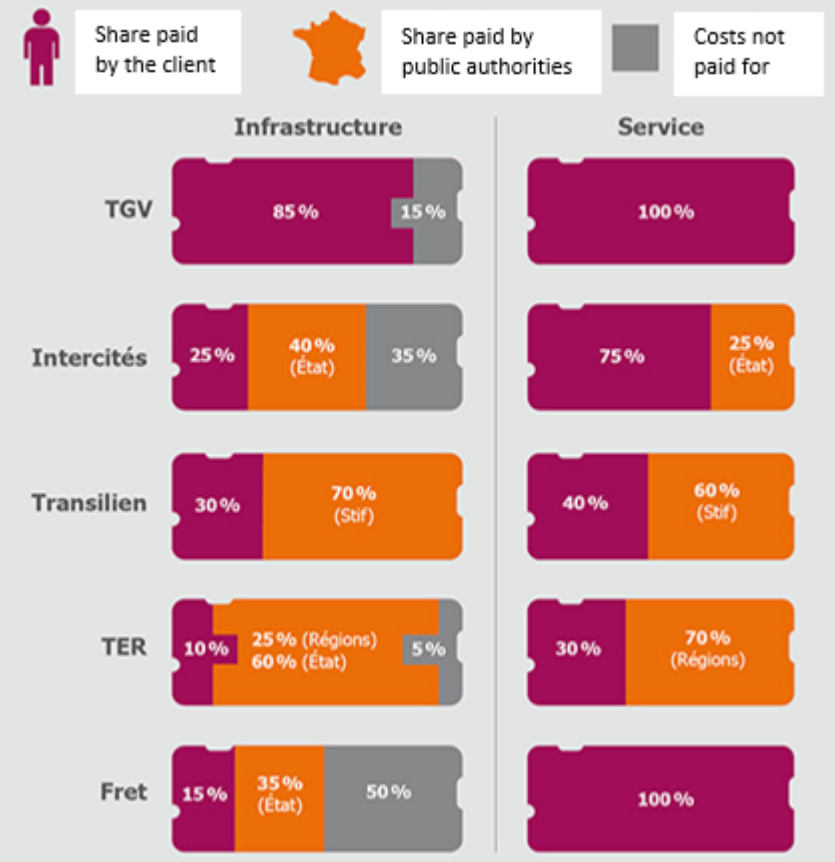

Figure 4: 2011 Infrastructure and Service Cost Distribution ("Réforme du system ferroviaire", 2014)

The RFF's funding came in large part, about two-thirds, from the tack usage fees that the SNCF paid and the remaining thirds from subsidies coming from the public authorities. However, in 2008 public authority subsidies were reduced from an average of 2.6 billion euros to only 2.2 billion. This constriction of public funding did not go unnoticed by the RFF whose annual deficit began markedly increasing as shown in Figure 5 (Eymery et al., 2015).

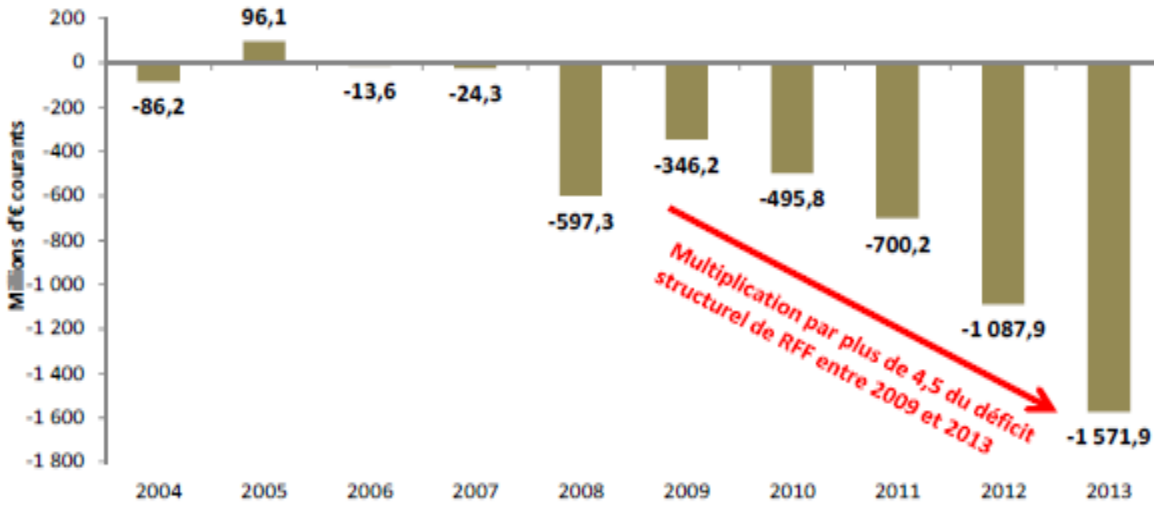

Figure 5: Annual RFF Deficit Excluding Expansion Costs 2004-2013 (Eymery et al., 2015).

As a means of off-setting this reduction in public subsidies the RFF increased its tolls to the SNCF, as was noted in an earlier section. The SNCF compensated for this increase in tolls by raising ticket prices, passing on the cost increase to the consumer. Between 2008 and 2013, France saw a 20 percent increase in the cost of train travel, refer to the black line in Figure 6, an increase far surpassing inflation (blue line) and air travel (green line). This increase in RFF's tolls launches a viscious cycle in which increasingly expensive train tickets shift riders to other modes, reducing ridership, leading to fewer trains, resulting in even less toll-revenue for the RFF (Eymery et al., 2015).

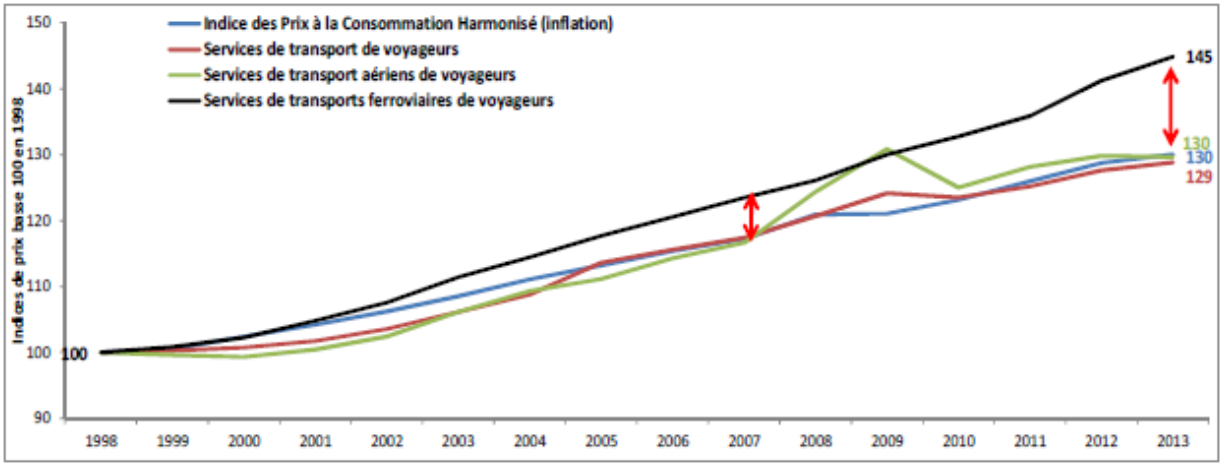

Figure 6: Index of Travel Prices from 1998-2013 in France (Eymery et al., 2015)

In 2013, the RFF's expenses (excluding rail expansion projects) were as follows: 45 percent operating costs, 38 percent infrastructure maintenance, and 17 percent debt servicing. In addition, the RFF had an aggressive rail expansion budget which far exceeded the amount of resources available. The agency's 2013 deficit was 3 billion euros, of which half were linked to expanding the system and the other half operating expenses (Eymery et al., 2015).

Discussion of debt pre-reform

This section of the report sought to understand why debt was being incurred in order to judge whether or not this debt was taken on in the interest of the public. Budgetary analysis showed that over one-third of operating expenses were for system maintenance and that half of the budgetary deficit was due to investment in rail expansion (Eymery et al., 2015). These cost overruns indeed contributed to the maintenance and expansion of a national, public good for past, current, and future generations.

However, it must be noted that these spending decisions did not happen solely in response to organizational restructuring in 1997 with the separation of the SNCF. While the relationships and agreements in the "train triangle" lack transparency, it is clear that political pressures for the expansion of high speed rail coupled with reduced State subsidies in France have led to budgetary deficits; not the constant creation and liquidation of public agencies. Rail reforms have allowed inconspicuous debt restructuring as a means to undertake additional costly rail expansion projects.

Figure 7 shows that despite an additional 485 kilometers of HSR opening between 2008 and 2013 (a 33 percent increase in the supply of track) train kilometers traveled increased by only 2 percent compared to a combined increase of 25 percent by car and plane (Eymery et al., 2015). Eymery et al. (2015) attribute this narrow growth to the stark increase in the cost of train travel relative to these other modes which originated from a reduction of State subsidies by 0.4 billion euros (refer back to Figure 6). It must be noted that despite this small gain relative to that of air travel, HSR passenger traffic "exceeds domestic air transport by a factor of more than 10" (Crozet, 2014).

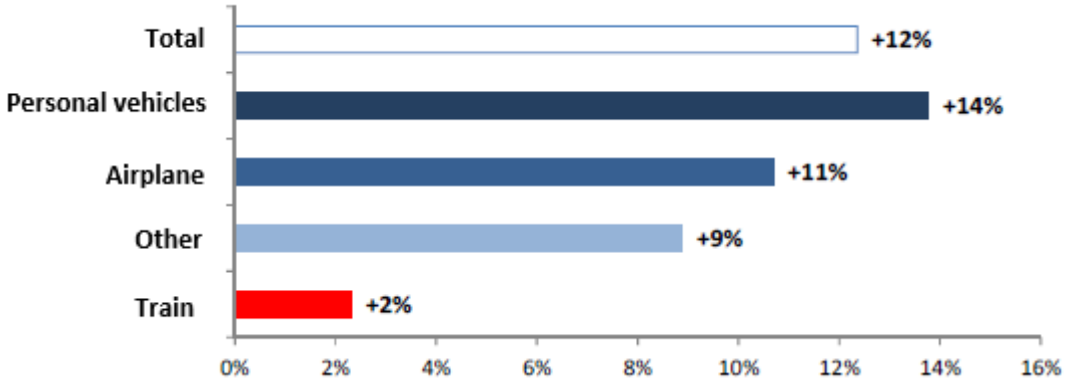

Figure 7: 2008-2013 Change in Kilometers Traveled by Mode (Eymery et al., 2015)

Since January 1, 2015, when the RFF was absorbed back into the SNCF as SNCF Réseau, there has been no disclosure of where that 33.6 billion euro debt (in 2013) has gone. A third party analysis of the 2017 reform has identified three possible alternatives for dealing with the debt (Eymery et al., 2015):

1. *State takes on a portion of the debt*

The French government did not internalize the 20.5 billion euros which were transferred to the RFF in 1997 which weighed heavily on the RFF until 2014. The first option is for the government to take on this debt and its cumulative costs, a sum estimated to be close to 25 billion today. Eymery et al. (2015) argue that the State made a poor decision in 1997 and should be held liable. Furthermore, they ascertain that interest rates are at a "historic low" and the State is able to take on this debt with such a favorable rate.

2. *Debt payment rescheduling*

Rescheduling the debt payments would allow to spread out the installements. High speed rail is considered a long term investment whose benefits and financial return are deferred to subsequent generations.

3. *Reduction in interest rate*

A 2013 report on the RFF's debt stated that the organization's interest rate was 4.13 percent (Eymery et al., 2015). The French treasury's borrowing rates for 10 years have fallen far below

that amount, hovering around 1 percent in 2015, see Figure 8 (France-Inflation, 2015). A decrease in the interest rate would significantly reduce the interest owed on the debt.

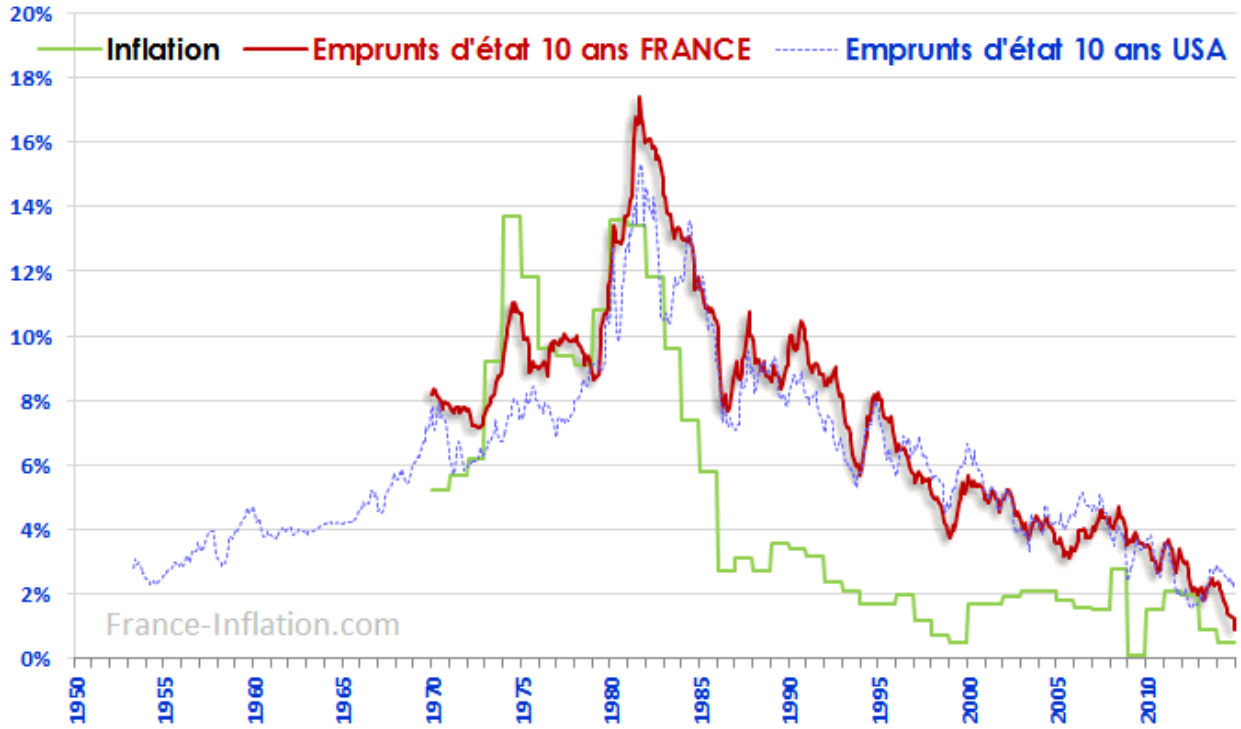

Figure 8: Historic Trend of 10 Year Borrowing Rate for France & USA (France-Inflation, 2015)

If the totality of the debt was transferred to SNCF Réseau, without any of the aforementioned debt management options implemented, or new funding sources, debt will continue to rise until 2025 at a decreasing pace, as the principal of SNCF Reseau's accrued debt is paid off (Eymery et al., 2015).

As a means for controlling expansion related debt, the August 4, 2014 law stipulates that the SNCF cannot take on any expansion projects which exceed a debt to income ratio determined yearly by parlement (Art. L. 211-10). Only when projects are financed by the State, territories or other entities can this ratio be exceeded (Art. L. 211-10). This stipulation is a means of deflecting financial risk from the SNCF onto another entity. While it is a sound concept, it is not retroactive and effectively does nothing to relieve current levels of debt for the four HSR projects underway.

French HSR Financing Models

Public debt financing

The high levels of debt incurred by the SNCF prior to the 1997 reform, discussed earlier, were the result of public debt financing. The SNCF's initial strategy was to construct the lines with the greatest joint financial and social returns first. This selection method led to the construction of Paris-Lyon route on the TGV Sud Est which had an expected rate of return of 12 percent (Henn et al., 2013). The TGV Sud Est was financed entirely with SNCF debt with project costs at 1.28 billion euros (in 2016 euros) (Domergue et al., 1997). It proved to be a large success when returns exceeded 15 percent and the debt was fully amortized just 12 years after opening (Henn et al., 2013).

However, the success with this financing method quickly tapered out as less profitable routes were built and the SNCF no longer had the ability to "self-finance" (Domergue et al., 1997). These less profitable routes were partially paid for by public authorities to guarantee that the SNCF's minimum return criteria of 8 percent could be met (see Figure 9) (Henn et al., 2013).

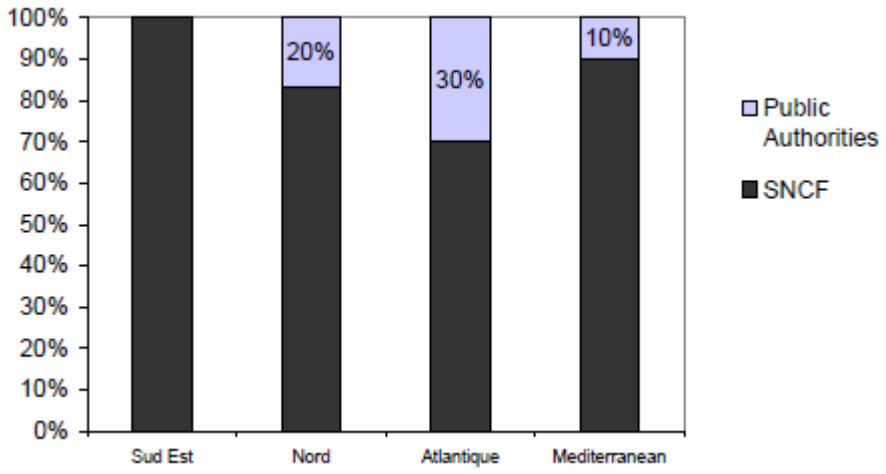

Figure 9: Financing HSR Projects Until 1997 (Henn et al., 2013)

Debt & subsidy combination

The 1997 rail reform shifted the financing responsibility away from the SNCF onto the RFF where projects were "guaranteed by State appropriations or by borrowing" (Domergue et al.,

1997). After the reform, the RFF became the sole project undertaker, assuming the risk for construction and maintenance. Projects were financed with a blend of RFF debt and "a portion of full investment cost" supplemented by a range of subsidies from the State, local authorities, the European Union (EU) and for transnational lines, neighboring states as well (Henn et al., 2013).

Two high speed rail lines were constructed with this finance structure, the LGV Est (phases 1 and 2) and the LGV Rhin-Rhone; neither of which met the RFF's required 8 percent return threshold. To compensate for the projected low financial returns, the RFF financed less than 30 percent of each and the remainder was a blend of State, EU and regional funds (Henn et al., 2013).

Public-private partnership (P3): design-finance-build-run-maintain

The first public private partnership of its kind, the Tours-Bordeaux TGV extension is being designed, financed, built, and will, in 2017, be run and maintained by a single entity – COSEA. COSEA is a "special-purpose entity created to build the rail line by Vinci, a big French construction and concession company". Vinci has created additional special purpose units to finance and run the line. The financing entity, LISEA, raised 3.8 billion euros in equity and loan capital and received 3 billion in public government subsidies and 1 billion from the RFF ("Where there's a will", 2014).

The total project costs came in at 8 billion euros, a sum too great for the publicly-owned SNCF ("Where there's a will", 2014). In exchange for Vinci building the Sud Europe Atlantique TGV line from Tours to Bordeaux, the SNCF agreed to pay tolls to run their trains on the line. LISEA has set the tolls at 48 euros per train per kilometer a sum which will plunge the line into insolvency according to the SNCF. The SNCF announced that they would lose between 150 and 200 million euros a year in part due to the tolls and because ridership projections have dropped substantially since 2009 (Jacqué, 2015).

In 2009, the SNCF's Tours-Bordeaux's 2017 ridership estimates were 17 million yearly riders. However, with the ongoing French financial crisis, the 2017 estimate was revised to 13 million

riders due to increasing car-sharing and flying mode shares. LISEA disagrees with the estimates and believes that the one-hour time savings brought by the new line will increase the attractiveness of the line by 20 percent; their ridership projection is 18 million yearly passengers (Jacqué, 2015).

LISEA announced that they are not opposed to reducing the toll as long as the SNCF returns the train frequency to what it had been in 2009, prior to the lower ridership estimates. The contract between LISEA and the SNCF does include a clause which will allow renegotiation a year and a half after the line opens based on the economic returns of the line (Jacqué, 2015).

Discussion

French policy makers and presidents have shared considerable enthusiasm for high speed train since its launch in 1981 (Barone et al., 2011). This has enthusiasm has translated to national policy. In 2010, the "National Scheme for Transport Infrastructures" called for the development of an additional 2,000 kilometers of rail by 2020; as of 2015, France has 2,037 kilometers of tack (Crozet, 2014). A study of high speed rail development cots in 2013 estimated that each kilometer of new infrastructure costs around 15 million euros to lay (Henn et al.). Given these numbers, an additional 2,000 kilometers would cost about 30 billion euros, a doubling of the RFF's 2013 debt.

Clearly, there is a disconnect between the wants of policymakers and the funding available for lofty expansion projects. It is this type of policy to budget mismatch which led the RFF and the SNCF before it to accrue large amounts of debt. The solution has seemingly been to engage in public-private partnerships. France has four P3 financed HSR projects in the pipeline: the Sud Europe Atlantique (previously discussed), the Franco-Spanish cross border, the Bretagne Pays de la Loire, and the Countournement Nimes (Henn et al., 2013). However, studies of mature P3s awarded in the rail sector have shown little promise (Crozet, 2014).

An analysis of the Tours-Bordeaux line exposes the financial obligation of the SNCF as a clear limitation of the design, finance, build, run and maintain concessionaire agreement. France's

financial crisis has resulted in unanticipated reductions in ridership, as predicted by the SNCF. The concessionaire has the upper hand given that they set the tolls for the next 50 years and do not have to renegotiate the terms until 18 months after opening (Gradt, 2015). A review of 27 P3s in rail showed that concessionaires "make over-optimistic ridership forecasts" (Crozet, 2014). Clearly the Sud Europe Atlantique agreement is no exception. A benefit of this public-private partnership is that the risk of building and financing is assumed by the private entity. Given they shoulder this liability, they are incentivized to stay on schedule and within budget. The Tours-Bordeaux line spanning 340 kilometers, was engineered in 'record time' ahead of schedule, only 38 months (Gradt, 2015). The sooner they finish construction, the sooner they are able to collect revenue through concessions. Whether or not this was a sound deal financially for the SNCF remains uncertain until the line opens in 2017 and the concession matures.

French HSR as a Model?

A review of the literature published on the benefits and limitations of implementing High Speed Rail in the United States reveals that the French system is often cited as a model of successful HSR development to be reproduced. This literature bases French success on the TGV's ability to provide reliable service and "free up capacity for freight trains" (Ashiabor et al., 2013); its ability to increase economic ties between regions and capitals (Garmendia et al., 2012); result in a high rate of social return (Henn et al., 2013); "competitiveness over other modes" with high speeds leading to short travel times (Eidlin, 2015); catalyze city development through HSR access (Eidlin, 2015).

However, what these articles fail to consider when using France as a model for HSR development is the debt which has ensued. When the first high speed rail line opened in France the country was governed by Francois Mitterrand, a socialist (Encyclopedia Britannica). Socialism provided the political context for breaking ground on subsequent high speed rail lines with lower net return (less profitable) but high rates of social return (Henn et al., 2013).

The political economy of the United States is capitalism, where projects are seldom built when they are not estimated to have a return on investment above a given threshold. Understanding the political economy in which large infrastructure projects are being undertaken is critical to their success; without creative funding strategies and realistic revenue projections, many HSR projects cannot sustain themselves. Planners should ask themselves who is paying upfront, if there is enough funding secured, and who the burden would fall upon if the line does not generate forecasted revenue.

Conclusion

France is often referred to as a successful example of high speed rail development. Indeed, the country was the first in Europe to have HSR and it now boasts over 100 million passengers a year but the SNCF is in many ways still maturing (Freemark, 2011). The agency has experienced two major rail reforms in the last 20 years and experimented with three unique financing methods.

This paper sought to examine the history of the SNCF in order to better understand the root cause of the debt and whether it was incurred for a social good or due to a misuse of funds. Seemingly, the debt has undertaken been to create a practical network of rapid transportation which connects a country, its' cities and its people. However, it is too soon to be able to conclude if the SNCF has found a sustainable financing method through public-private partnerships.

Perhaps Campos and De Rus (2009) said it best, "[HSR] is a very expensive and risky transportation system that requires careful case-by-case socioeconomic appraisal". Further research needs to be carried out when the four P3s currently under construction have been in operation for a few years before other countries look to the French HSR development as a model for their own.

Lessons learned from this research:

- Separation of rail operations and management leads to failure; even when both agencies are public they are competing for the same funds
- If possible, negotiate long-term subsidies, for a set amount, from the State; healthy financial planning cannot occur without it
- Borrow and build when interest rates are low
- Social returns are not monetary returns; they cannot be the only reason for construction unless the state or other government agencies will foot a part of the bill
- Reshuffling debt between agencies does not make it disappear, it just pushes it around
- P3 contracts have to include stipulations in which public agencies are not held liable for private sector's over-projected ridership, through fees or tolls
- 'Build and they will come' is not always the case; what alternatives are there to rail, how much do they cost, will they jeopardize HSR's ridership?

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